

### Sir Isaac Newton

#### Equilibrium and The Conservation of Energy

Newton's theory and Biomechanics based on 2 assumptions;

- i) Equilibrium -perfect situation where more then one force acts on the body but because the sum of forces is zero no change in velocity results
- ii) Conservation of Energy -energy can never be created or destroyed but can only be converted from one form to another

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### Newton's Three Laws

- 1) **The Law of Inertia:** Every object in a state of uniform motion tends to stay in motion unless an external force is applied on it.
- 2) **The Law of Acceleration:** A force applied to a body causes an acceleration of that body of a magnitude and direction proportional to the force, and inversely proportional to the objects mass.
- 3) **The Law of Reaction:** For every action there is an equal and opposite reaction.

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### Levers:

A lever is a rigid structure (ie. limb) hinged at one point and to which forces are applied to two other points.

- The hinge or Pivot point is called the fulcrum 
- One of the forces is called the weight or resistance that opposes movement (**R**) usually gravity
- The third point is called the force that causes or intends to cause movement of the lever (**F**).

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### Levers

Every movable bone in the body, acting alone or with others is part of a lever system that facilitates movement.

#### Examples of Levers

##### First Class-

i.e. soccer throw in : pivot point (shoulders)  
resistance (weight of the ball behind head)  
force (serratus anterior and pecs)

i.e. chest pass in Basketball:

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##### Second Class-

i.e. push ups : pivot point (toes)  
resistance (weight of the body)  
force (triceps)

i.e. golf shot

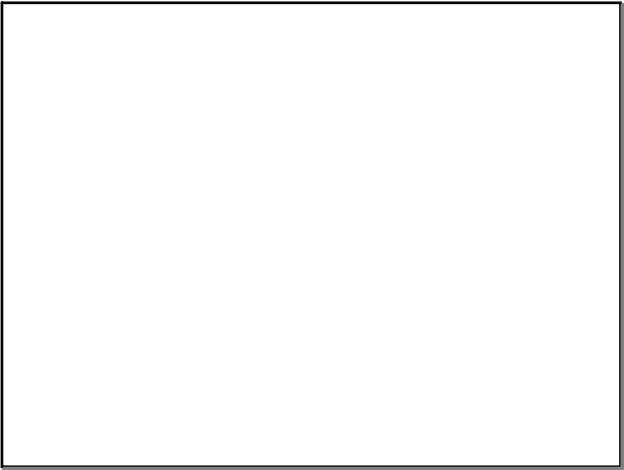
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##### Third Class-

i.e. sit-ups : pivot point (pelvis)  
resistance (weight of the trunk)  
force (abdominals)

i.e. drop kick

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